

Oh, Jeong Hun

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The Foreign Exchange Market With the Cryptocurrency and "Kimchi Premium"

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The Foreign Exchange Market

With the Cryptocurrency and “Kimchi Premium”^{*}

Jeong Hun Oh^{**}

ABSTRACT

This paper explores the remarkable roles of exchange rates when a cryptocurrency is adopted and commonly used as another type of foreign currency in the international economy. First, in order to examine its movement, we describe the price of a cryptocurrency as the relative price in terms of a standard currency using the exchange rate formula. Second, we identify three determinants of the “Kimchi premium” from the equilibrium condition in the foreign exchange market: the gaps in the rates of return of the cryptocurrency, the interest rates of the standard currencies, and the expected cryptocurrency exchange rates. Finally, using the money market and the foreign exchange market rationalities, we demonstrate the process that the new cryptocurrency in a country can cause a rise in the money supply, a fall in the interest rate, and a rise in the exchange rate in the end.

Keywords: Cryptocurrency, “Kimchi premium,” Exchange rate, Interest Rate

I. Introduction

The foreign exchange market has never been as important as it is now. In the recent years, countries have become more closely connected than ever before through trades in goods and services, flows of money, and investment in each other’s economies. One of the most important reasons behind this connection is that there are gains from these international trades and monetary transactions. In the real world, however, there are no simple guidelines for these activities to generate the mutual benefits in the international economies since most

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^{**} Professor at the Graduate School of International Studies, Korea University. Email: ojh@korea.ac.kr

international trades and monetary transactions take place under a complex environment, especially in the foreign exchange market (Krugman et al., 2015; Shastri et al, 2017; Mouaouy, 2018). Furthermore, today's globalized and digitized economies are demanding for a new type of currency known as cryptocurrency so that the cross-border monetary transactions can be completed instantaneously, securely, with minimal transaction costs, and with no central government interventions (Carrick, 2016; Ciaian et al., 2016; Oh & Nguyen 2018).

Regardless of the multifaceted environment of international economies, the exchange rate in the foreign exchange market can play an essential role because it allows participants to compare the prices of goods and services produced in different countries and then use these relative prices in their activities for the corresponding profits. There are large amount of papers exploring these noteworthy roles of exchange rates in the foreign exchange market: controlling the long term interest rates and the fluctuations in economic growth (Dropsy 1996), retaining price stability and export competitiveness in an economy (Benazic & Kersan-Skabic, 2016), incorporating political factors with the domestic and international economic features (Rodriguez 2016), valid interest rate parity conditions (Rabitsch, K. 2016), positively influencing on the values of domestic firms (Jeon et al. 2017), etc.

This paper explores the remarkable roles of exchange rates when a cryptocurrency is adopted and commonly used as another type of foreign currency in the international economy. This paper, using the interest rate parity condition, defines the relative price of cryptocurrency and identifies the sources of a premium known as “Kimchi premium”¹ in the cryptocurrency exchange market. In addition, we demonstrate how the newly introduced cryptocurrency in a country can cause a rise in the exchange rate in the foreign exchange market.

There are numerous studies on the discovery of cryptocurrency prices. (Dowd 2014; Brandvold et al. 2015; Cheah & Fry 2015; Dyhrberg 2016; Ji & Chun 2016; Panagiotidis et al. 2018; Sovbetov 2018 etc.) Nevertheless, only a few papers address the topics about the diverse prices of a cryptocurrency in different economies. (Brandvold et al. 2015) Several papers, perceiving the positive aspects of cryptocurrency such as low transaction costs and

¹ The “Kimchi premium” is the gap in the cryptocurrency price that is higher in South Korean exchanges than foreign exchanges. When the gap is positive, it is called “Kimchi premium” in reference to the fermented cabbage that is indispensable in Korean gastronomy. When the gap is negative, it is called “Hamburger premium.”

divisibility, articulate its imminent capabilities to fulfill the key functions of money (e.g. Luther and White 2014; Folkinshteyn et al. 2015; Carrick 2016; Sauer 2016; Oh & Nguyen 2018). There are also some papers in the literature that discuss about the role of cryptocurrency as a global currency. (Carrick, 2016; Ciaian et al., 2016)

This paper distinguishes itself from the other previous researches as follows: First, in order to examine its movement, we describe the price of a cryptocurrency as the relative price in terms of a standard currency using the exchange rate formula. Second, we identify three determinants of the “Kimchi premium” from the equilibrium condition in the foreign exchange market: the gaps in the rates of return of the cryptocurrency, the interest rates of the standard currencies, and the expected cryptocurrency exchange rates.² Finally, using the money market and the foreign exchange market rationalities, we demonstrate the process that the new cryptocurrency in a country can cause a rise in the money supply, a fall in the interest rate, and a rise in the exchange rate in the end.

This paper proceeds as follows. In chapter II, the interest rate parity condition is applied in order to identify the causes of “Kimchi premium.” In chapter III, we examine the changes the newly introduced cryptocurrency can make in both money market and foreign exchange market. Empirical evidence about “Kimchi premium” is provided in chapter IV and conclusions are in chapter V.

II. “Kimchi Premium” in the Cryptocurrency Exchange Market

The market in which international currency trades take place is called the foreign exchange market. Now we consider an emerging form of currency known as cryptocurrency in the foreign exchange market. Our goal in this chapter is to understand how the cryptocurrency performs in the foreign exchange market. First, we examine how the exchange rate, the price of cryptocurrency in terms of the Korean Won, is determined when the cryptocurrency is accepted and commonly used as any other foreign currency in a country such as South Korea. And then, we determine the three causes of “Kimchi premium”: the

² Brandvold et al. (2015) and Pieters & Vivanco (2017) discovered through their empirical studies that the diversity in the trading volumes and in the financial regulations can shape the different prices of a cryptocurrency. As their remarks, the study on this topic is scarce and, to the best of our knowledge, this paper is the first study that uses a theoretical approach on this topic.

gaps of the rates of return of the cryptocurrency, the interest rates of the standard currencies, and the expected cryptocurrency exchange rates in two different countries, South Korea and U.S.

Because the exchange rate is also an asset price, the principles governing the movements of other asset prices also govern the movements of cryptocurrency exchange rates. Just as asset prices are determined by the interactions of players in the market, exchange rates between the won and cryptocurrency are decided by the buyers and sellers of the won and cryptocurrency in the domestic and international markets. As changes in exchange rates are described as depreciations or appreciations, a depreciation of the cryptocurrency against the won for example is a fall in the cryptocurrency price in terms of the won. On the other hand, an appreciation of the cryptocurrency against the won is a rise in the cryptocurrency price in terms of the won.

In order to understand how the cryptocurrency exchange rates are determined and changed in the foreign exchange market, we must understand how the major players' demands for the won and cryptocurrency are determined. The demands for won and cryptocurrencies are influenced by the same considerations that effect the demand for any other asset. One of these main considerations is the view of what the currency will be worth in the future.³ A currency's future value depends on two factors: the rate of return it brings and the currency's exchange rate against other currencies.

Define the rate of depreciation of the cryptocurrency against the won as the percentage increase in the cryptocurrency/won exchange rate over a year. Then the cryptocurrency rate of return on won deposit is approximately the won interest rate plus the rate of depreciation of the cryptocurrency against the won. We describe the expected rate of return on a won deposit, measured in terms of cryptocurrency, as the sum of (1) won's interest rate and (2) the expected rate of cryptocurrency depreciation against the won:

$$R_w + (E_{cc/w}^e - E_{cc/w})/E_{cc/w}, \text{ where}$$

R_{cc} : the rate of return on cryptocurrency over a year,⁴

³ Refer to Friedman (1956) about the demand for a currency.

⁴ Since cryptocurrency is a new type of asset, how its rate of return will be determined in the future is still remained to be seen at this moment. If cryptocurrency is recognized as a currency (bond), R_{cc} will be the money interest rate (bond yield). Panagiotidis et al. (2018) studied on the determinants of bitcoin returns and found that Google search intensity, gold

R_w : the interest rate on won deposit over a year,

$E_{cc/w}$: the cryptocurrency/won exchange rate, and

$E_{cc/w}^e$: the expected cryptocurrency/won exchange rate a year from present.

Hence, the difference of the expected rates of return between cryptocurrency and won deposit is:

$$R_{cc} - [R_w + (E_{cc/w}^e - E_{cc/w})/E_{cc/w}]$$

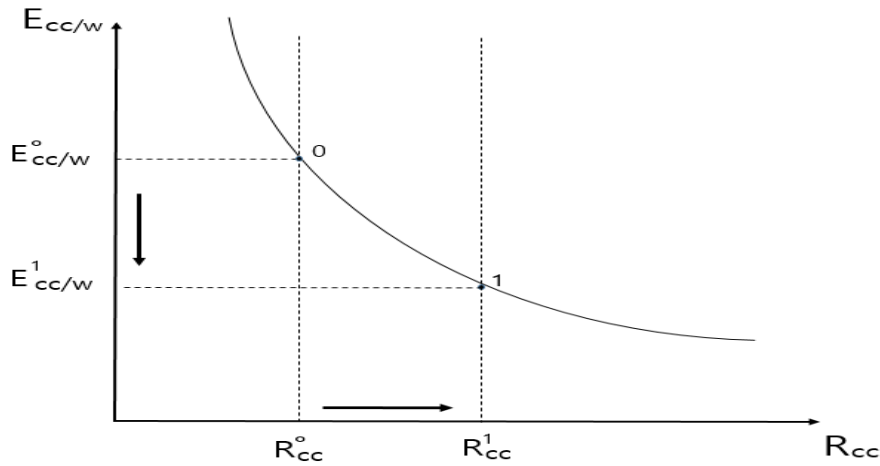
When this difference is positive, cryptocurrency yields a higher expected rate of return, when it is negative, won deposit yields a higher expected rate of return.

The foreign exchange market is in equilibrium when all currencies offer the same expected rate of return. Now, according to the interest rate parity condition, the expected rates of return on cryptocurrency and won are in equilibrium when

$$\begin{aligned} R_{cc} &= [R_w + (E_{cc/w}^e - E_{cc/w})/E_{cc/w}] \\ E_{cc/w} &= E_{cc/w}^e / (R_{cc} - R_w + 1) \end{aligned} \quad (1)$$

When cryptocurrency offers a higher return than won deposit, the cryptocurrency will appreciate against the won as players will buy cryptocurrency more. Conversely, the cryptocurrency should depreciate against the won when it is the won deposit that offers a higher return.

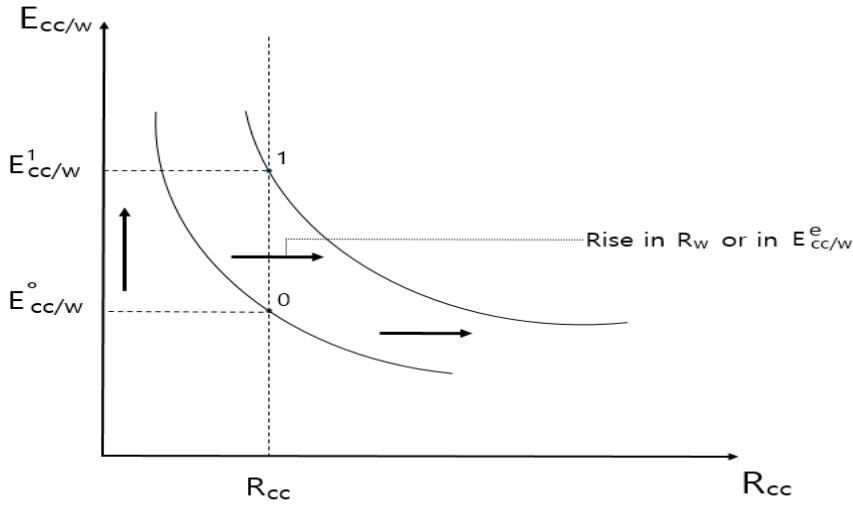
<Figure 1>



<Figure 1> illustrates how the equilibrium cryptocurrency/won exchange rate is determined. The downward sloping schedule shows how the cryptocurrency/won exchange rate depends on the expected rate of return on won deposit measured in terms of cryptocurrency. The vertical schedule in the graph indicates the given level of R_{cc} , the rate of return on cryptocurrency. The equilibrium cryptocurrency/won rate is the one indicated by the intersection of the two schedules at point 0. At this exchange rate, the returns on cryptocurrency and won deposit are equal, so that the interest parity condition (1) is satisfied.

Having seen how exchange rates between cryptocurrency and won are determined by the interest rate parity condition (1), we take a look at how current exchange rate are affected by the changes in interest rates, rates of return, and expectations about the future of the two currencies. <Figure 1> shows that a rise in the rate of return on cryptocurrency, from R_{cc}^0 to R_{cc}^1 , as a rightward shift of the vertical cryptocurrency return schedule, causes the exchange rate to fall from $E_{cc/w}^0$ to $E_{cc/w}^1$, hence the cryptocurrency appreciates against the won.

<Figure 2>



<Figure 2> shows the effect of a rise in the won interest rate, from R_w^0 to R_w^1 , as a rightward shift of the downward-sloping schedule. A rise in won interest rates leads the exchange rate to rise from $E_{cc/w}^0$ to $E_{cc/w}^1$, hence to a depreciation of the cryptocurrency against the won. Furthermore, it shows that a rise in the future expected exchange rate, $E_{cc/w}^e$, can also cause the exchange rate to rise from $E_{cc/w}^0$ to $E_{cc/w}^1$, allowing for the cryptocurrency to depreciate against the won. Similarly, a fall in the won interest rate or the expected future exchange rate causes a fall in the current exchange rate, $E_{cc/w}$, leading to an appreciation of the cryptocurrency against the won.

Now, we examine the movements of the two exchange rates, $E_{cc/w}$ and $E_{cc/\$}$, when the two rates of return of the cryptocurrency in the South Korea and U.S., R_{cc}^K and R_{cc}^{US} , are altered with different magnitude. We identify the origin of “Kimchi premium” from the different movements of these two exchange rates.

As we have seen from <figure 1>, a rise in the rates of return on cryptocurrency, R_{cc}^K and R_{cc}^{US} , causes the exchange rates, $E_{cc/w}$ and $E_{cc/\$}$, to fall respectively. Now from the equation (1), when $\Delta R_{cc}^K > \Delta R_{cc}^{US}$, $|\Delta E_{cc/w}| < |\Delta E_{cc/\$}|$ holds. Assuming other variables are constant⁵, if the rate of return of cryptocurrency in South Korea has been increase more than

⁵ One of the most essential variables under this stability assumption, is the won/dollar foreign exchange rate. As a matter of fact, it was steady during December 2017, the time when the cryptocurrency market displayed a significant level of “Kimchi premium.”

that in U.S., the exchange rate in terms of won decreases more than the rate in terms of dollar, which creates the “Kimchi premium”.

Similarly, the different amount of changes in the interest rates between R_w and $R_\$$; and in the expected exchange rates between $E_{cc/w}^e$ and $E_{cc/\e can generate the “Kimchi premiums” as well. From the equation (1), when $\Delta R_w < \Delta R_\$$ or $\Delta E_{cc/w}^e < \Delta E_{cc/\e , $|\Delta E_{cc/w}| < |\Delta E_{cc/\$}|$ holds. Again, assuming other variables are constant, if the interest rate of U.S. dollar, $R_\$$, is increased more than that of won, or the expected cryptocurrency exchange rate is increased more in U.S., the exchange rate in terms of won decreases more than the rate in terms of dollar, generating the “Kimchi premiums.”

This result demonstrates that the “Kimchi premium” can exist even when the risk levels and liquidity levels are identical in the two countries. This price difference was apparent during December 2017, when the price of bitcoin in South Korea was up to more than 40% higher than the price in the U.S.⁶ These kinds of differences should have been eliminated shortly through arbitrage trading. However, capital controls, financial regulations, and anti-money laundering laws, etc. in South Korea make the arbitrage difficult. And these factors have been considered as the causes of the “Kimchi premium”.

Ironically, the related policies and regulations in South Korea have become more stringent since the periods with the significant level of “Kimchi premium”. But the “Kimchi premium” has considerably decreased in recent periods.⁷ Hence, there must be other determining factors of the premium in the cryptocurrency exchange markets. This paper suggests that the gaps in the rates of return of the cryptocurrencies, the interest rates of the standard currencies, and the expected cryptocurrency exchange rates can be other factors that influence the “Kimchi premium”.⁸

III. The Impact of Cryptocurrency on the Foreign Exchange Market

In this chapter, we show that the cryptocurrency in one country can cause a rise in the money supply, a fall in the interest rate, and a rise in the exchange rate.

⁶ <Figure 4> on page 11 shows this trend.

⁷ See <Figure 5> on page 12 for the trend.

⁸ The empirical evidence on these three determining factors is presented in chapter IV.

When the cryptocurrency, CC , is introduced in an economy, total money supply, Ms ,⁹ is determined by adding the standard currency in circulation C and checkable deposits D , alongside the changes in the money supply with the newly issued cryptocurrency, αCC ,¹⁰ leading to the following equation:

$$Ms = C + \alpha * CC + D$$

The monetary base will be noted as MB where standard currency in circulation is C , the changes in the money supply with the newly issued cryptocurrency is αCC , and the total amount of reserve is R . In terms of the money multiplier, the currency in circulation over checkable deposit ratio includes the newly issued cryptocurrency to be $\frac{C+\alpha*CC}{D}$ where D represents the amount of checkable deposit. The following equations are then obtained:¹¹

$$MB = C + \alpha * CC + R, \text{ where } R = RR + ER, RR = r_D * D$$

$$Ms = m * MB, \text{ where } m = \frac{1 + \frac{C + \alpha * CC}{D}}{r_D + \frac{ER}{D} + \frac{C + \alpha * CC}{D}}$$

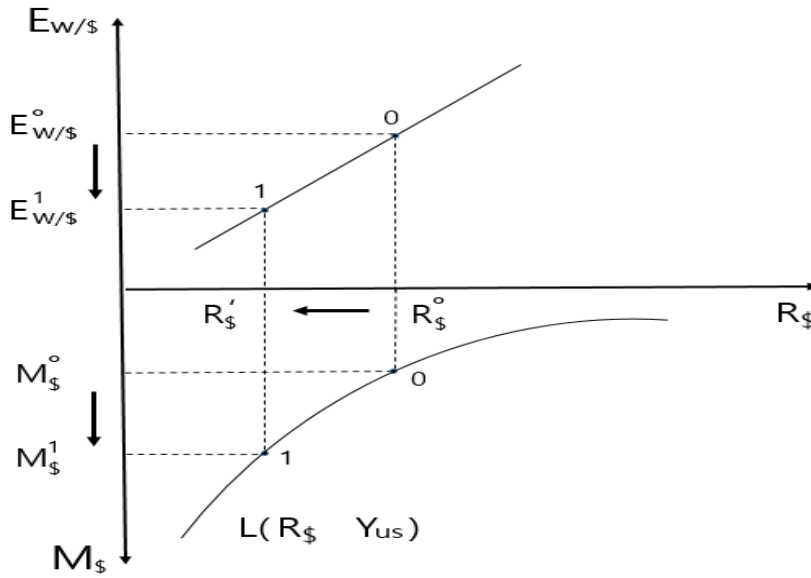
From these equations, it can be seen that the total amount of money supply Ms will be increased by the amount of the newly issued cryptocurrencies CC . Specifically, as αCC increases, MB increases and consequently Ms does as well. Furthermore, if the cryptocurrencies newly issued are accepted by the central and commercial banks, it will positively affect checkable deposits D and the money multiplier m , so money supply Ms can be increased even more.

<Figure 3>

⁹ Ms refers to the most liquid portion of money, here defined as standard paper money & coin, checking accounts, and demand deposits. Total money supply includes both standard money and cryptocurrency, whereas standard money supply excludes cryptocurrency in its definition.

¹⁰ When the newly issued cryptocurrency plays the same role as standard currency, $\alpha=1$. Depending on the level of attractiveness of the cryptocurrency to the users, α can have different values from 1.

¹¹ For the more details, refer to Oh & Nguyen (2018).



<Figure 3> shows the simultaneous equilibrium in the U.S. money market and the won/dollar foreign exchange market, where $L(R_{\$}, Y_{us})$ is the aggregate money demand in U.S., $R_{\$}$ is the interest rate of U.S. dollar, and Y_{us} is the GNP of U.S. The U.S. money market determines the dollar interest rate, which in turn affects the won/dollar exchange rate in order to maintain interest rate parity condition. Both asset markets are in equilibrium at the interest rate $R_{\0 and exchange rate $E_{w/\0 . At these values, money supply equals money demand in the U.S. money market at point 0 and the interest rate parity condition holds in the won/dollar exchange market at point 0 as well.

Now we examine the effect on the won/dollar exchange rate and dollar interest rate of an increase in the U.S. money supply by the newly issued cryptocurrency. Assuming Y_{us} is constant, when the new cryptocurrency causes money supply to rise from $M_{\0 to $M_{\1 , the dollar interest rate declines from $R_{\0 to $R_{\1 as money market equilibrium is reestablished at point 1. Furthermore, the dollar depreciate against won as the exchange rate declines from $E_{w/\0 to $E_{w/\1 as the foreign exchange market equilibrium reestablished at point 1 as well.¹²

As cryptocurrency use in the U.S. becomes more frequent and extensive, U.S. money increases and the won/dollar exchange rate falls. This negative movement of won/dollar

¹² Sovbetov (2018) confirms this phenomenon with an empirical result that in the long run cryptocurrency price is negatively associated with the U.S. dollar to Euro and U.S. dollar to Yuan exchange rates.

exchange rate in the foreign exchange market can produce an adverse influence on the balance of trade in South Korea in the future.

IV. Empirical Evidence on the “Kimchi Premium”

Bjerg (2016) describes a cryptocurrency as “*a commodity money without gold, fiat money without state, and credit money without debt.*” Although cryptocurrency has not been established by gold, central government, or a credit system, as a viable alternative to standard currency, it is considered to be able to execute the key roles of money for global monetary transactions as well as domestic.

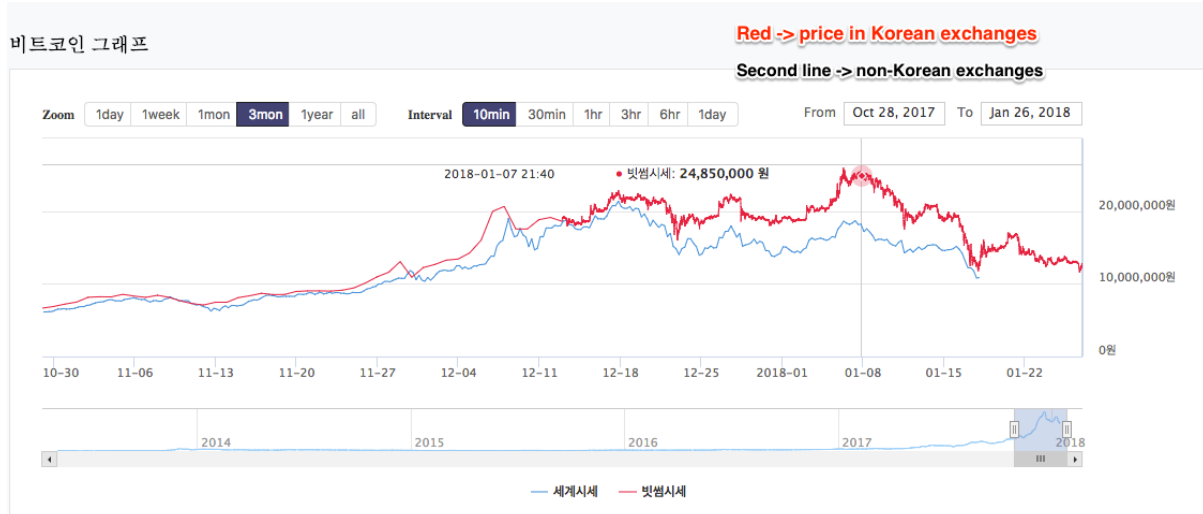
4.1 “Kimchi premium”

Now we begin with the special South Korean phenomenon where South Koreans pay significantly higher local prices for cryptocurrencies than investors in other countries. This price premium is called the “Kimchi premium,” the term after an indispensable preserved food in South Korea. The “Kimchi premium” is noteworthy because it exhibits unusual market dynamics.

Cryptocurrency prices between South Korea and other countries were not that different in early 2017. However, the price difference became apparent in December 2017, when the price of bitcoin in South Korea was 10% to almost 40% higher than the price in U.S. This difference climbed up to more than 30% at the end of 2017, and finally recorded an all-time high of 50% on Jan. 8, 2018, as in <Figure 4>.¹³

<Figure 4>

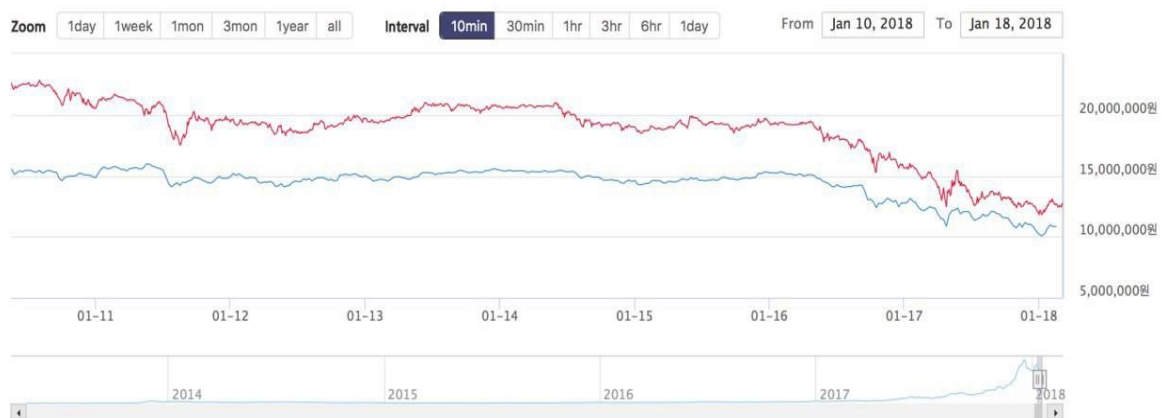
¹³ Other cryptocurrencies showed similar patterns. For instance, Ethereum’s “Kimchi premium” was from 10% to 40% in December 2017 and it climbed up to 53% on Jan. 8, 2018.



Source: Medium.com (2018)

South Korea has been one of the leading markets for cryptocurrencies, accounting for approximately 15% of trading. However, the conflict between the South Korean government's opposition against cryptocurrencies and the South Korean people's affection for them created the room for the "Kimchi premium" to soar up 10% to 50%. The "Kimchi premium" became an unusual but fascinating phenomenon enough to draw the investor's intense interests.¹⁴

<Figure 5>



Source: Medium.com (2018)

¹⁴ For the more details, refer to Medium.com (2018).

In recent periods, however, cryptocurrency prices have been going down, and so has the “Kimchi premium” as in <Figure 5>. This decline in the premium may reveal an incident that came when South Korean government interfered with the market to restrain this extreme phenomenon. However, the weakening premium does not indicate that South Koreans’ affection for cryptocurrencies has faded. The decline in the premium is not because people’s interest has been plunged, but rather the attitude of South Korean government toward cryptocurrencies has become more restrictive.

In theory, this kind of premium should have been short-lived through arbitrage trades. As soon as investors recognize the price mismatches, they trade until the premium vanishes. However, these trading tactics were not effective in South Korea when it came to cryptocurrencies. The strict laws and regulations regarding financial transactions in South Korea made the process difficult. These factors have been considered as the causes of the “Kimchi premium.” (Pieters & Vivanco, 2017)

Ironically, the related policies and regulations in South Korea have become even more stringent since the periods with the significant level of “Kimchi premium”. On the other hand, “Kimchi premium” has been considerably decreased in recent periods, as shown in <Figure 4> and <Figure 5>. Hence, there must be other sources of the premium in the cryptocurrency exchange markets.

This paper suggests three determining factors of the “Kimchi premium” from the equilibrium condition in the foreign exchange market: the gaps in the rates of return of the cryptocurrency, the interest rates of the standard currencies, and the expected cryptocurrency exchange rates in different countries. Without question, there are various factors other than these three determinants that influence the “Kimchi premium”. Factors such as economy size, trading volume, risk, liquidity, regulations, and many others can also yield those premiums and the arbitrage opportunities.

4.2 Determining Factors

Since the diverse movements of cryptocurrency prices between South Korea and other countries create the “Kimchi premium,” the factors influencing cryptocurrency prices can be considered as the rudimentary sources that determine the premium. Here we attempt to

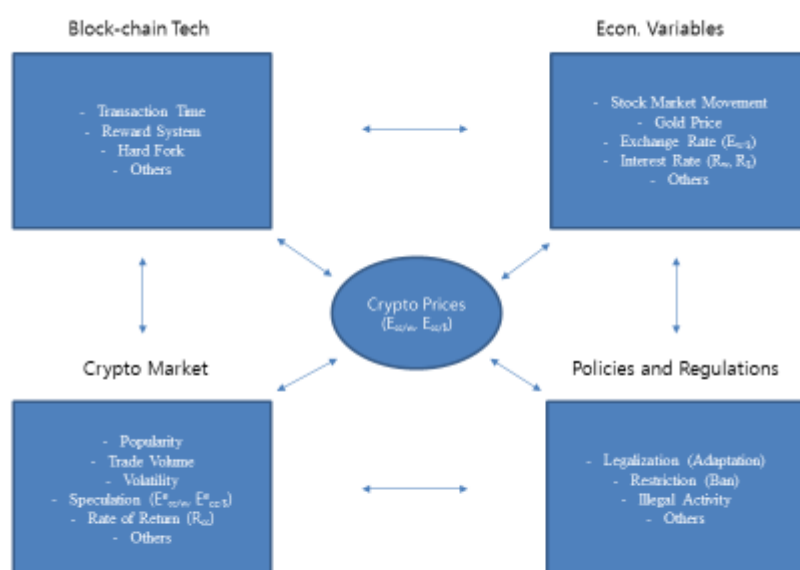
convey the main ideas and results on the determinants of cryptocurrency price that have emerged through recent empirical studies.¹⁵

The previous studies explore potential drivers, such as economic, transactional, technical and interest. They examine the factors that influence the price investors are willing to pay for cryptocurrencies, and describe the relationship between the price and the set of determining factors. Here, using the similar framework proposed by them, we classify the cryptocurrency price drivers into four groups: block-chain technology, cryptocurrency market, economic variables, and lastly policies and regulations as in <Figure 6>.

Among the determining factors, speculations in the cryptocurrency market can be considered as variables that represent the expected exchange rates such as $E_{cc/w}^e$ and $E_{cc/\e . As discussed in chapter II, the different movements of these two variables create the “Kimchi premiums.” The diverse movements in the rates of return in the cryptocurrency market such as R_{cc}^K and R_{cc}^{US} , as well as in the interest rates among the economic variables such as R_w and $R_{\$}$, were also proven to cause the premiums. In addition, the value of an exchange rate such as $E_{w/\$}$ in the economic variables can be altered by the newly issued cryptocurrency as in chapter III. As being described in the <Figure 6>, all variables are connected to one another so that a change in one variable will affect the others.

<Figure 6>

¹⁵ This part is reorganized from Brandvold et al. (2015), Kristoufek (2015), Pieters & Vivanco (2017), Poyser (2017), Panagiotidis et al. (2018), and Sovbetov (2018).



Source: Modified from Poyser (2017) and Sovbetov (2018)

(1) Block-chain Tech

Block-chain technology is one of the main driver groups that directly affect the cryptocurrency price. Influential factors in the block-chain technology group include transaction time, reward system, hard fork, security system, etc.

The determining factors of the transaction time are hash rate, confirmation time, and proof of work (PoW)/proof of stake (PoS). These factors also measure the productivity and transaction costs of cryptocurrencies. It was expected that they would have a negative relationship with the price. However, while Kristoufek (2015) found a small but positive effect on the price, Poyser (2017) was not able to find any relevant effect.

Regarding the reward system, cryptocurrencies have a controlled supply by the block height and block reward schedule. In other words, the supply of a cryptocurrency is programmed to be exogenously fixed and has a deflationary spiral. As with any commodity, a decrease in supply when demand remains constant generally leads to higher price. Hence, the cryptocurrency price is positively related to the block reward system.

A hard fork is a term that describes a radical change to the protocol that makes previously invalid blocks or transactions valid (or vice-versa). A hard fork occurs when a cryptocurrency's existing code is changed, splitting in two in order to result in both an old and new version. A hard fork can be implemented to correct important security risks found in older versions of the software, to add new functionality, or to reverse transactions. The

cryptocurrency price is expected to fluctuate due to arising confusion, but it moves back to the original price. For example, bitcoin practiced a hard fork that led to the creation of bitcoin cash. There was an initial surge in price, but has fallen steadily. (Quora.com 2018)

(2) Crypto Market

Cryptocurrency market is another main driver group that has a direct impact on the cryptocurrency price. The determining factors in the cryptocurrency market are popularity, trade volume, volatility, speculation, and the rate of return, etc.

In terms of a popularity factor, the previous studies use activities in the cryptocurrency community such as Google search frequency, Twitter sentiment, Wikipedia search queries, etc. Sovbetov (2018) analyzed social activities in cryptocurrency communities in order to examine if those activities affect cryptocurrency price. The study provides evidence for the significant role of social activities in cryptocurrency communities in determination of its price, but only in the long run. This indicates that the formation of cryptocurrency popularity is subjected to time.

Trading volume also appears to have significant impacts (Brandvold et al. 2015; Sovbetov 2018). It was found that in the long run cryptocurrency price is positively related to its circulation. These long-run estimates seem to be larger than their short-run magnitudes, indicating that responses of the cryptocurrency price to the market trading volume are higher in the long-run.

The volatility in the cryptocurrency market displays statistically significant long-run impacts on all cryptocurrencies. Even if the expected returns on cryptocurrency is higher than those on other assets, people become hesitant to hold cryptocurrency when its price varies in large amounts unpredictably. The sign of impact is negative, which indicates an increase in volatility of a market causes its cryptocurrency price to drop. The short-run market volatility also appears statistically significant and negatively signed as it was in the long-run. Moreover, short-run magnitudes are several-fold comparing to their long-run magnitudes, signaling that the cryptocurrency prices show more severe reaction to the market's volatility in the short-run.

Even though cryptocurrency is a recent invention, it has been gaining attention as an investment asset. Cryptocurrency is considered as a speculative asset and its behavior is related to other assets or market indexes. There is evidence of the relative isolation of cryptocurrencies from the financial and economic assets. Hence, cryptocurrencies may offer

diversification benefits for investors with short investment horizons. Correspondingly, the previous studies have tried to answer if cryptocurrency behaves as a safe haven or hedge like gold or silver under risk situations in the stock market. The change in the standard deviation of gold's price is negatively linked to the change in cryptocurrency price, suggesting that cryptocurrency acts as a hedge in relation to the gold. Looking at the relationship to the stock market indicator, the standard deviation in the S&P500 index is shown to be negatively related to that in the cryptocurrency price. These evidences supported that cryptocurrency had been performing as a diversifier and hedge.

An increase in the cryptocurrency market return causes its price to increase both in the short and long run. The short-run estimates are higher comparing to their long-run coefficients, indicating that their responses are more sensitive in the short-run. Cryptocurrency as other assets may be valued by users for attributes other than the rate of return it offers. Cryptocurrency users take into account two additional features other than its return: its risk and its liquidity. Hence, the demand and price for cryptocurrencies depend not only on returns but also on risk and liquidity.

(3) Econ Variables

"Econ Variables" is regarded as third main driver group that has direct impact on the cryptocurrency price. Economic variables such as stock market movement, gold price, exchange rate, and the interest rate appear to be significant determinants of the cryptocurrency prices both in the short and long run.

Sovbetov (2018) observes a weak but negative impact of stock markets (S&P 500 index) on cryptocurrency price, in particular bitcoin. It shows that an increase in S&P500 index causes bitcoin prices to decrease in the short-run. An inverse relationship is also documented in the long-run as well. This confirms negative correlation between cryptocurrency prices and stock market prices in both short-run and long-run.

Increasing risks in financial markets have established the need to invest in other type of assets such as gold. The theoretical argument about the existence of such assets is that investors have incentives to reduce losses in times of market stress. Poyser (2017) shows the negative relationship between the cryptocurrency price and the price of gold.

Similarly, macroeconomic variable such as exchange rate also plays a significant role to determine the price of cryptocurrency. Sovbetov (2018) shows that in the long run

cryptocurrency price is negatively associated with the U.S. dollar to Euro and U.S. dollar to Yuan exchange rates.

All currencies around the world are connected to one another so that a change in one currency will affect the others. Although cryptocurrency is not like a standard currency yet, its value will be influenced when the interest rates for standard currencies are altered by central banks or government. Cryptocurrency's value is directly related to its demand and supply schedules. Since the higher interest rates offered by central banks will encourage people to hold standard currency rather than cryptocurrencies, cryptocurrency can become less valuable.

(4) Policies and Regulations

Last but not least, "Policies and Regulations" is another main driver group that has direct impact on the cryptocurrency market price. The determinants in the policies and regulations group are legalization (adoption), restriction (ban), and illegal activity.

Since the beginning 2016, the price of cryptocurrencies in Russia has been showing incremental movements. This incidence is not deceiving since Russia, alongside with Japan and Sweden, have been the main three key countries trying to legalize the use of cryptocurrency as a currency. Another country where cryptocurrency has an important relevance is Venezuela, where its price shows incremental movements as well. According to Poyser (2017) and Oh & Nguyen (2018), the political and economic conjuncture, loss in government fate and uncertainty, have been producing interest in cryptocurrency for its use on multiple purposes. Cryptocurrency can insulate its value from any government upheaval that may occur and devalue certain currencies.

When the South Korean government proposed a ban on cryptocurrency trading, its price showed an intense plunge. This outsized impact of South Korean regulation, as well as the threats of a ban in China, may have been a leading cause in the sell-off of cryptocurrencies in January 2018. Regulations such as domestic currency restriction, complexity of transactions, and prohibiting foreign investment, act as bans on the cryptocurrency trading. Furthermore, the South Korean government also indicated that it may consider alternatives to a complete ban, such as having investors pay capital gains taxes. (Investopedia.com 2018)

According to Pieters & Vivanco (2017) and Poyser (2017), cryptocurrency can attract ample interests from the unobserved illegal activities, since it controls its creation and

transactions away from central authority. Cryptocurrency, unlinked from the control of government and central authority, puts its governance power into the user's hands. Regulators are likely to block the cryptocurrency transactions to combat their use in the unlawful activities such as money laundry, hacks and thefts, fund terrorism, illegal trade for drugs, etc.

Regardless of the heterogeneity of the cryptocurrency's competency conditions as a currency, almost all of the studies agree in the fact that cryptocurrency's future as a currency is essentially linked to its credibility, acceptance, and endorsement from users and merchants (Luther & Salter 2015).

V. Conclusions

Today's globalized and digitized economies are craving for a new type of monetary transaction which can complete its duty through decentralized network, secure system, minimal transaction costs, and seamless domestic and international transactions. Since cryptocurrency has drawn the public's attention as delivering these services in the economy, there have been numerous studies on whether it will fulfill the roles of money and become a plausible substitute for standard currency. After seeing the embryonic but evolving potentials and capabilities of cryptocurrency through various previous researches, it is time to pay attention to a new question of whether cryptocurrency is capable of being a medium of exchange in the international economy.

This paper examines whether this emerging new type of currency known as cryptocurrency can be implemented appropriately as a standard currency for cross-border monetary transactions in the foreign exchange market. Using the interest rate parity condition, we describe the price of a cryptocurrency as the relative price in terms of a country's currency in order to examine its rise and fall. Three determinants of the "Kimchi premium," have been revealed: the gaps in the rates of cryptocurrency returns, the interest rates of the standard currencies, and the expected cryptocurrency exchange rates in South Korea and other countries. Using the money market and the foreign exchange market models, we illustrate how the new cryptocurrency in one country can cause a rise in the exchange rate. Finally, in order to make the global economy more compatible with the revolutionary digital technology known as blockchain, this paper recommends central banks and governments should explore the feasible impacts of cryptocurrencies on the foreign exchange market more deeply.

This paper has examined a particular situation of the cryptocurrency in the foreign exchange market. Since cryptocurrency is still in a nascent and burgeoning stage, many results in this paper can be considered to be inconclusive hitherto. There is a way that future studies can demonstrate the findings of this study. It would be desirable to test the outcomes through empirical studies using data in a statistical methodology framework.

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